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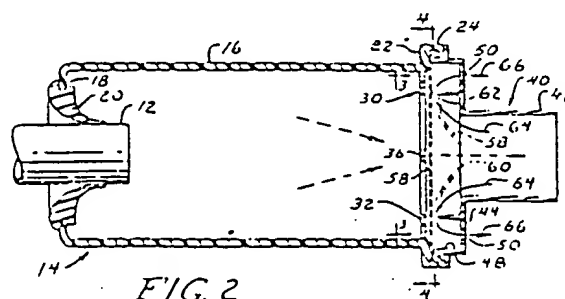
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(54) Inhalation valve.

(57) An inhalation valve including means defining a passageway (16) having an entering end (18) and an exit end (22), a mouthpiece (40) at said exit end for receipt in a patient's mouth, means (20) at said entering end for receiving structure for supplying inhalation medication, a diaphragm (58) adjacent said exit end and mounted with freedom to move at least in part towards said mouthpiece upon inhalation by said patient to permit movement of inhalation medication from said passageway into said mouthpiece and the mouth of said patient, and means (30) immediately upstream of said diaphragm backing up said diaphragm against movement thereof away from said mouthpiece to prevent retrograde flow upon exhalation by said patient.



EP 0 134 847 A1

against the asthmatic attack.

Objects and Summary of the Invention

5 In accordance with the present invention a valve accompanying an extended mouthpiece for a broncho dilator of the type just described is provided which aids the asthmatic sufferer in properly inhaling, and in breaking up droplets into a mist form.

10 Thus, the principle object of the present invention is to provide an improved valve for converting epinephrine or other broncho dilator into a proper mist for inhalation by a person suffering an asthmatic attack.

15 It is a further object to the present invention to provide a valve as just noted which is cooperable with a large number of existing commercial broncho dilator mouthpieces for providing improved mist and inhaling by the patient.

20 It further is an object of the present invention to provide a universal extension fitting for broncho dilators including a one-way valve which opens upon inhalation without bypassing any ambient air into the inhaled mist,
25 and which closes upon exhalation with the exhaled breath bypassed and not entering into the chamber containing the broncho dilator mist.

In carrying out the foregoing and other objects and
30 advantages, we have provided an extension fitting for broncho dilators having an elastomeric receiver fitting about the existing mouthpiece of a commercial broncho dilator device. This receiver is at the entering end of a cylinder, which cylinder has a mouthpiece at the opposite
35 end. An elastomeric valve is provided between the cylinder and the mouthpiece, which valve comprises a generally

cartridge, sometimes referred to as a nebulizer, is charged with epinephrine or other suitable antiasthmatic medication in a suitable diluent, and under pressure. The cartridge fits into a receiving end of a right angle mouthpiece 12, the opposite end of which is placed in the asthmatic sufferer's mouth. The cartridge is pressed down, being squeezed between the index finger and the thumb underlying the mouthpiece. This causes a valve stem in the cartridge to press against a reaction base in the mouthpiece to discharge a measured quantity of medication into the mouthpiece. The discharge is supposed to be in a form of a mist, but in fact often contains small droplets. The patient inhales, and the mist passes into the mouth, and hopefully into the bronchial tubes to provide asthmatic relief. The patient is then supposed to hold his breath for a short time, and subsequently to inhale slowly through nearly closed lips. However, as noted heretofore, some of the medication may simply be in the form of droplets rather than mist, and the droplets generally do not reach the bronchial tubes to effect their intended purpose.

We have found that the drops can be broken up into a mist, and the patient can be more or less forced to inhale properly with the use of the inhalation valve forming the subject matter of the present invention, and for which reference should be had particularly to Fig. 2, and also to Figs. 3 and 4.

As shown in Fig. 2 there is an inhalation valve 14 comprising a cylinder 16 preferably molded of a suitable plastic material. The cylinder is provided at its entering end (the left end in Fig. 2) with a radially inwardly directed flange 18 of limited extent. This flange retains a generally frustoconical elastomeric adapter 20 which receives the mouthpiece 12 previously referred to. The frustoconical shape and the elastomeric nature of the

The flange 48 is axially somewhat longer than the flange 46, as will be explained shortly, and it is provided at its extremity with a radially extending annular flange 52 which snaps over the tapered surface 26 and behind the shoulder 28 so that the mouthpiece element 40 is held in assembled position with the cylinder 16. The entering end face of the flange 52 is provided with an annular recess 54, and the confronting face of the flange 22 on the cylinder 16 is provided with a complementary rib 56.

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An elastomeric diaphragm 58 is trapped between the flange 52 and the flange 22, being securely held in place by the complementary rib 56 and recess 54. As is particularly seen in Fig. 4, the diaphragm 58 is provided with a diametral slit 60 which in relaxed position lies across the aligned ribs 38. As now will be seen, the relative shortness of the ring or flange 46 as compared with the flange 48 provides for clearance space 62 between the flange 46 and the diaphragm 58.

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In order to use the present inhalation valve, the mouthpiece 12 of the prior art is inserted in the member 20, as previously described. The mouthpiece 22 is received in the mouth of the person suffering an asthmatic attack. The cartridge is pressed down in the mouthpiece to release a measured amount of medication, in accordance with the prior art. However, rather than the misted medication passing directly through the mouthpiece into the mouth of the person using it, the mist is passed into the cylinder 16. The elongated flow path provided by the cylinder allows further opportunity for droplets to atomize or evaporate into a mist. As the person inhales, the diaphragm 58 deflects toward the person's mouth, as illustrated in broken lines in Fig. 2, thus allowing the slit 60 to open, and thus to pass the misted medication.

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through the throat and stomach where it does no good.

The specific example of the invention as herein shown and described is for illustrative purposes only. Various
5 changes will no doubt occur to those skilled in the art, and will be understood as forming a part of the present invention insofar as they fall within the spirit and scope of the appended claims.

6. An inhalation valve as set forth in any of claims
3-5 characterized in that said opening comprises a slit.

7. An inhalation valve as set forth in claim 6 characterized
in that said spider has a rib (38) aligned with and backing
5 up said slit.

8. An inhalation valve as set forth in any of the preceding
claims characterized in that the receiving structure in-
cludes an elastomeric frusto-conical member (20).

valve surface of said diaphragm into engagement with said rim valve seat to seal off said exhaust port means and disengagement from the rim valve seat upon exhalation to exhaust through the exhaust port means.

2. An inhalation valve as set forth in claim 1 wherein said central opening comprises a diametral slit (60).

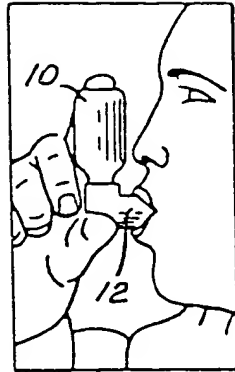
3. An inhalation valve as set forth in claim 2 wherein said mouthpiece includes an annular transverse plate (44), a tubular portion (42) extending downstream from said annular transverse plate adjacent the inner margin thereof for receipt in a patient's mouth, said annular flange (46) being spaced outwardly of said tubular portion and extending upstream from said annular transverse plate.

4. An inhalation valve as set forth in claim 3 wherein said exhaust port means comprise openings (50) in said annular transverse plate (44) outwardly of said annular flange (46).

5. An inhalation valve as set forth in claim 2 wherein said backup means comprises a spider (30).

6. An inhalation valve as set forth in claim 1 wherein said mouthpiece includes an annular transverse plate (44), a tubular portion (42) extending downstream from said annular transverse plate adjacent the inner margin thereof for receipt in a patient's mouth, said annular flange (46) being spaced outwardly of said tubular portion and extending upstream from

FIG. 1



PRIOR ART

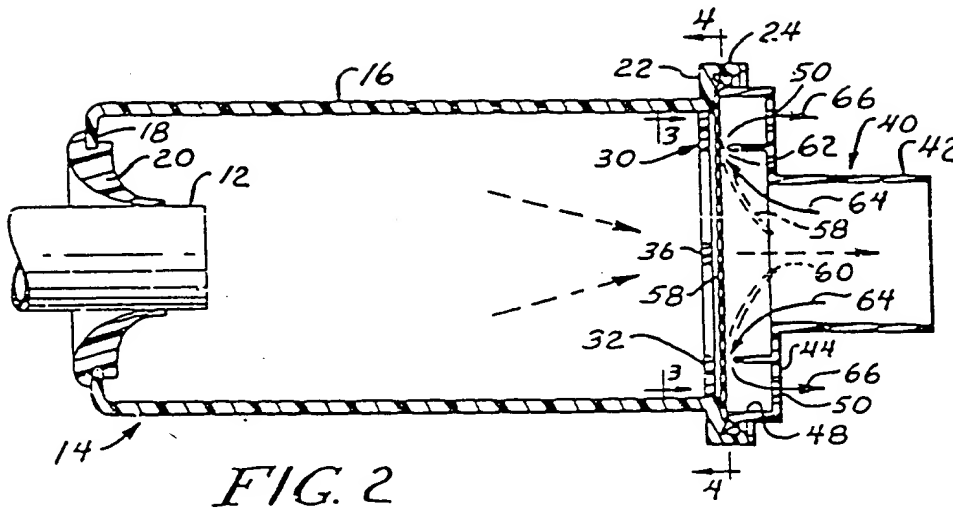


FIG. 2

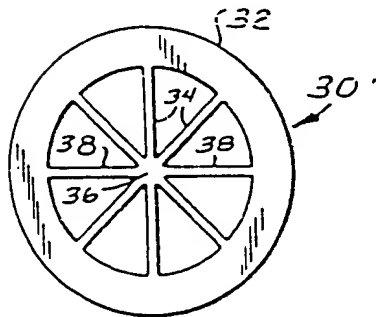


FIG. 3

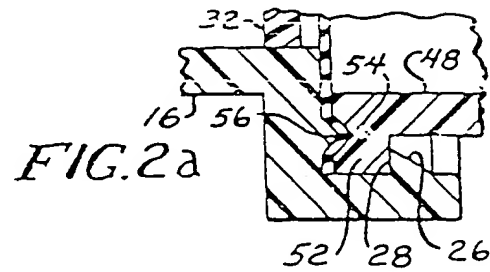


FIG. 2a

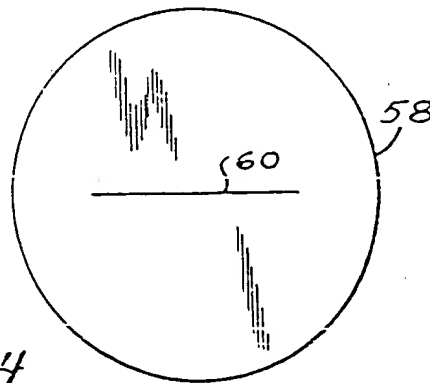


FIG. 4